

REMARKS

Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Upon entry of the above amendments, claims 1-23 and 25-45, and new claims 46-49 will be pending in this application.

The claims are amended in response to the formal grounds of rejection under 35 USC 112, including elimination of "preferred" amounts and proportions and to eliminate improper multiple dependencies and to conform claims 30 and 45 to the amounts previously inserted in the preliminarily amended claim 1. The new claims conform to subject matter deleted from the original claims in response to the formal rejections.

Accordingly, no new matter is added.

The specific claim amendments are discussed below in connection with the particular rejections.

First, claims 33 and 34 are no longer multiply dependent. Accordingly, these claims should be examined on the merits.

Claim 28 is cancelled and replaced by corresponding method claim 49. Accordingly, the rejections under 35 USC 112 and 101 are avoided.

The dependency of claim 3 is changed to claim 1 and the preferred ranges are removed from that claim. Incidentally, the typographical error in claim 2 (which depended on itself) is also corrected.

In claims 15 and 38, the "added" chain extender refers to externally added active hydrogen compounds used as chain extenders, in contrast, for example, to the indirect chain extenders, such as water, as discussed on page 10 of the specification. Accordingly, claims 15 and 38 do further limit the claims from which they depend since the independent claims do not require added chain extender as the active hydrogen compound (B).

Claim 38 as well as claims 36 and 37 are now made to depend from claim 30.

The extra comma in claim 39 is deleted.

Accordingly, the rejections in Paragraph 4, page 3, are removed and/or respectfully traversed.

With regard to the rejection of claims 1-32 and 35-45 in Paragraph 5, it is confirmed that the percent value for the acid group is weight percent. This follows from the definition of acid value in terms of milliequivalents, per 100 g of prepolymer, together with the

reference to % of the acid-functional groups being neutralized. See also, for example, page 6, lines 19-21, wherein the DMPA quantity used to provide acid functional groups is given as a weight percent based on the polyurethane polymer; page 12, lines 8-14, wherein neutralization is reported as a percentage of the amount of acid functional groups, given as weight%; and page 19, lines 25-30, wherein again, neutralization is given as based on the amount of acid groups and, specifically, line 30, referring to an excess of 10 weight%.

Accordingly, this ground of rejection is respectfully traversed/avoided.

All Markush groups are now recited using the “selected from the group consisting of a, b ... and z” format.

Therefore, the rejection in Paragraph 6 is respectfully traversed/avoided.

Regarding claim 27, Applicants do not agree that in the context of “monolayer” or “laminate” the term “type” renders the scope indefinite. One skilled in the art would recognize monolayer type films and laminate type films as comprehending single and multiple layer films, respectively. While applicants disagree, however, the language of claim 27 is changed to “monolayer construction” or “laminate construction.” See, e.g., page 17, lines 15-18.

Therefore, the rejection in Paragraph 7, page 4, is respectfully traversed/avoided.

Turning to the rejection in Paragraph 8, page 4, Applicants wish to explain that in claim 30, no particular order of the recited steps is required. In fact, on page 8, lines 34-35 of the specification, it is explained that, for example, the stages (steps) I and II “are not necessarily carried out sequentially or as individual steps.” The specification, at page 8, line 35 to page 9, line 30, provides description of several different alternative embodiments.

Accordingly, claim 31 does, in fact, further limit claim 30 by referring to simultaneously performing steps II and III.

As for claim 37, this claim, now dependent on claim 30, refers to step II, rather than step III. Of course, as just explained above, steps II and III can, for example, be carried out simultaneously.

Accordingly, the rejection of claims 31, 32, and 37-44, for the reasons set forth in Paragraph 8, page 4, is respectfully traversed/avoided.

Claim 35 is corrected to refer to step I (rather than “1”). Accordingly, the rejection in paragraph 9, page 4, is avoided.

The cancellation of claim 24, obviates the rejection of this claim in Paragraph 10, page 5.

Finally, as noted above, the claims are amended to remove all references to “preferably”, “more preferably” and “especially” with regard to, e.g, ranges, groups, compounds, etc., in claims having a broader scope.

For the reasons set forth above, it is respectfully submitted that pending claims 1-23, 25-27, and 29-49, comply with 35 USC 101, and 35 USC 112, first and second paragraphs.

With respect to the merits, claims 1-32 and 35-45 are rejected under 35 USC 103(a) as unpatentable over Thomaides et al (‘840) in view of Markusch et al (‘852).

Applicants respectfully disagree and traverse this rejection for the following reasons.

As seen from the claims presented for examination, and as described throughout the specification, the present invention is concerned with providing film (and packaging materials, etc, using same) which are water-soluble at relatively low temperatures, between 5 and 35 °C. This is simply not the subject matter of the cited references nor do the references, individually or collectively, suggest this subject matter or, indeed, an operative process for making such low-temperature water-soluble films. In fact, just the opposite is desired in the references, especially the primary reference to Thomaides et al.

To begin with it should be appreciated that the water-soluble films, soluble in water at temperatures between 5 and 35°C, of the present application are of a type suitable for the provision of water-soluble packaging (sachets, capsules, bags) for which purpose (as explained in the specification) they should possess good mechanical properties, flexibility without using plasticiser (which could, for example, leach out to the contents), as well as water-solubility. This is achieved by the selection of a polyurethane polymer for the film having certain characteristics as set out in claim 1. Of particular relevance are:

- the polyethylene oxide (PEO) groups should have a chain length corresponding to a number average molecular weight not exceeding 3000 Daltons.
- the polyurethane is a chain extended product formed from an isocyanate-terminated prepolymer and an active hydrogen component.

Turning to ‘840, this is directed towards quite a different objective to that of the present invention, namely the provision of hair fixative compositions which comprise water-soluble or dispersible polyurethanes. These polyurethanes are intended to form hair holding films on

the hair substrates. The emphasis in the worked examples of this teaching is that the films should be stiff, in order to achieve good curl retention even at high humidity. Consequently their intended application is quite different to the films of the present application, the latter being required to have sufficiently good mechanical properties and flexibility as to be suitable for making packaging (see e.g. the properties of the working examples in Table 1, particularly the elongation to break range 305 - 427% indicating good flexibility as well as good tensile properties). The combination of the features mentioned above (required, inter alia, for the urethane films of the present invention) are not disclosed or implied in '840.

Turning specifically to the examples of the '840, polyurethanes A, B, C, D, E, G and H all employ a polyethylene glycol of molecular weight 8000. Polyurethane F employs a polyethylene glycol of molecular weight 3000. However, this polyurethane is not a chain-extended product as defined in claim 1.

To summarize, the purpose of the selection of features in the polyurethanes used for the films of the present invention, is, as mentioned above, to provide water-soluble films with good mechanical properties and flexibility, as would be suitable for the provision of water-soluble packaging (sachets, etc.). The purpose of '840 however, is to provide stiff hair fixative compositions - an entirely different objective and product. There is no disclosure or implication in '840 to select the combination of features as required in the present invention and, given that '840 is clearly not trying to achieve the same objective, it cannot possibly be the case that the skilled man would be motivated to adapt the combination of features used in the present invention. These deficiencies are not supplied or obvious in view of '852.

The Examiner's position is that it would be obvious to apply the teaching of '852 to that of '840 in order to arrive at the presently claimed invention, the reasoning being that '852 teaches that EO groups contribute to hydrophilic and water-dispersible characteristics and to use a prepolymer/chain-extension process which is lacking in '840.

However, it is pointed out that '852 nowhere discloses that it is concerned with the production of cold water-soluble films (i.e., soluble in water between 5 and 35°C) which would be useful for packaging. The object of '852 is to prepare coatings having, inter alia, improved hydrolytic stability and resistance to water swell (column 1, lines 39-48) which is confirmed by the working examples which indicate that the films are not cold water soluble.

Most of the examples in '852 indicate that the films are swellable (not soluble) up to the extent of about 17% (after submersion for 24 hours at room temperature) (see tables III,

V, and VI). Although Table IV discloses a film (example VIII) which swells to 105.9% after submersion for 24 hours at room temperature this has clearly not dissolved quickly at room temperature (as per the test given on page 18 of the description of the present invention, where any film with a dissolution time of >10 minutes at 10 to 20°C is considered insoluble).

For Example VIII in '852, it should be noted that even at 70°C it took 24 hours for dissolution. Further, apart from the foregoing, an application of '852 to '840 would not yield the films of the present invention because the films in '840 have to be stiff and would not be suitable for the water-soluble films of the present invention.

Thus, the present invention, as defined in the amended and new claims 1-23, 25-27 and 29-49, would not have been obvious over '840 in view of '852.


In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, he or she is kindly requested to contact the undersigned at the telephone number listed below.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned **"Version with markings to show changes made"**.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

PILLSBURY WINTHROP LLP

By: 

Richard A. Steinberg  
Registration No. 26,588  
Direct No. (703) 905-2039

Paul L. Sharer  
Registration No. 36,004  
Direct No. (703) 905-2180

1600 Tysons Boulevard  
McLean, VA 22102  
(703) 905-2000 Telephone  
(703) 905-2500 Facsimile  
Attorney Reference: 070662/0271885  
Enclosure: Appendix

**APPENDIX: VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS:**

1. (Amended) Water-soluble film comprising [a] at least one polyurethane [polymer(s)] polymer, which at least one polyurethane [polymer(s) has] polymer comprises:

2 to 35 weight %, based on the weight of polyurethane polymer, of poly(ethylene oxide) groups which have a chain length(s) corresponding to a number average molecular weight within the range of from 300 to 3,000 Daltons;

15 to 150 millequivalents, per 100g of polyurethane polymer, of acid-functional groups; and wherein

at least 50% of the acid-functional groups are neutralised, such neutralisation being with [a base(s)] at least one base, at least part of which is [a] at least one non-volatile [base(s)] base;

and said at least one polyurethane [polymer(s)] polymer is a chain extended product formed using:

(A) a prepolymer component comprising an isocyanate-terminated polyurethane prepolymer, said component being formed from reactants which comprise:

- (i) at least one organic polyisocyanate,
- (ii) at least one isocyanate-reactive compound providing said poly(ethylene oxide) groups in the resulting polyurethane polymer, and
- (iii) at least one isocyanate-reactive compound providing said acid-functional groups in the resulting polyurethane polymer, and

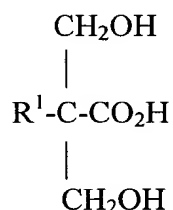
(B) an active hydrogen component comprising [an] at least one active hydrogen chain-extending [compound(s)] compound.

2. (Amended) Film according to claim [2] 1 wherein the amount of said poly(ethylene oxide) groups is within the range of 2 to 20 weight % based on the weight of the polyurethane polymer[, more preferably 2 to 15 wt %].

3. (Amended) Film according to either claim 1 [or claim 2] wherein the amount of said poly(ethylene oxide) groups is within the range of 5 to 35 weight % based on the weight of

the polyurethane polymer[, more preferably 5 to 20 weight %, and especially 5 to 15 weight %].

9. (Amended) Film according to claim 8 wherein the isocyanate-reactive compound providing acid functional groups is a dihydroxyalkanoic acid of formula



where  $\text{R}^1$  is hydrogen or alkyl[, preferably of 1 to 5 carbon atoms].

10. (Amended) Film according to claim 9 where said isocyanate-reactive compound is 2,2-dimethylol propionic acid (DMPA).

11. (Amended) Film according to claim 8 wherein the isocyanate-reactive compound providing acid functional groups is a diol bearing a sulphonic acid alkali metal salt[, preferably a sulphonic acid sodium salt].

12 (Amended) Film according to claim 1 wherein the reactants for forming the prepolymer component (A) include [an] at least one isocyanate-reactive [compound(s)] compound which is monofunctional with regard to isocyanate-reactive functionality and acts as a chain-terminating material for the prepolymer.

13 (Amended) Film according to claim 1 wherein said polyurethane polymer optionally incorporates poly(propylene oxide) groups[, preferably being at least in-chain groups and preferably being present in an amount of 0 to 60 weight % based on the weight of the polyurethane polymer, more preferably 0 to 45 weight %].

14 (Amended) Film according to claim 1 wherein said active hydrogen component (B) comprises [an] at least one active hydrogen chain-extending [compound(s)] compound provided by the reaction of water with said prepolymer[, preferably being the sole chain-extending material of component (B)].

16. (Amended) Film according to claim 15, wherein said added active-hydrogen chain extending compound is selected from the group consisting of a primary or secondary

aliphatic, alicyclic, aromatic, araliphatic or heterocyclic polyamine, [preferably a diamine, or] hydrazine (including its monohydrate) [or] and a substituted hydrazine.

18. (Amended) Film according to claim 1 wherein at least 90 weight% of the acid functional groups in the polyurethane polymer are neutralised[, more preferably 100%].

19. (Amended) Film according to claim 1 wherein at least 50 weight %[, more preferably 100 weight %,] of the [base(s)] at least one base used for neutralisation is selected from the group consisting of Group IA monovalent metal bases or basic salts, triethanolamine, 2-methyl-2-amino-1-propanol, and quaternary ammonium hydroxides.

20. (Amended) Film according to claim 19 wherein said base is selected from the group consisting of NaOH, KOH and LiOH[, and is preferably NaOH].

22. (Amended) Film according to claim 1 wherein the polymeric material thereof [also includes a polymer(s)] further comprises at least one other polymer which is other than a polyurethane and does not detract from the water-solubility of the film.

23. (Amended) Film according to claim 22 wherein said at least one other [polymer(s)] polymer is selected from the group consisting of polyvinyl alcohol and neutralised carboxylic acid - or sulphonic acid-functional vinyl [(preferably acrylic)] polymer.

25. (Amended) Aqueous solution of [a] at least one polyurethane polymer, [which polymer is as defined in claim 1] said at least one polymer comprising:

2 to 35 weight %, based on the weight of polyurethane polymer, of poly(ethylene oxide) groups which have a chain length(s) corresponding to a number average molecular weight within the range of from 300 to 3,000 Daltons;

15 to 150 millequivalents, per 100g of polyurethane polymer, of acid-functional groups; and wherein

at least 50 weight% of the acid-functional groups are neutralised, such neutralisation being with at least one base, at least part of which is at least one non-volatile base;

and said at least one polyurethane polymer is a chain extended product formed using:

(A) a prepolymer component comprising an isocyanate-terminated polyurethane prepolymer, said component being formed from reactants which comprise:



- (i) at least one organic polyisocyanate,
- (ii) at least one isocyanate-reactive compound providing said poly(ethylene oxide) groups in the resulting polyurethane polymer, and
- (iii) at least one isocyanate-reactive compound providing said acid-  
unctional groups in the resulting polyurethane polymer, and

(B) an active hydrogen component comprising at least one active hydrogen chain-  
extending compound.

26. (Amended) Water-soluble packaging[, preferably in the form of a sachet, capsule or bag,] in which the enveloping film of the [sachet] packaging comprises a film as defined according to claim 1.

27. (Amended) Water-soluble packaging according to claim 26 wherein the film thereof [is of the] has a monolayer [type] construction or [the] a laminate [type] construction.

29. (Amended) Combination of water-soluble packaging according to [either] claim 26 [or claim 27] and a material packaged therein.

30. (Amended) Process for the production of an aqueous polyurethane polymer solution, which polyurethane polymer has:

2 to 35 weight %, based on the weight of polyurethane polymer, of poly(ethylene oxide) groups which have a chain length(s) corresponding to a number average molecular weight within the range of 300 to 3000 Daltons;

15 to 150 milliequivalents, per 100 g of polyurethane polymer, of acid-functional groups; and wherein

at least 50 weight% of the acid-functional groups are neutralised, such neutralisation being with a base(s) at least part of which is a non-volatile base(s);  
said process comprising

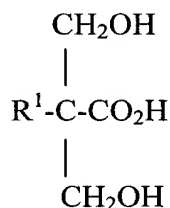
II. [synthesising] synthesizing a prepolymer component comprising an isocyanate-terminated polyurethane prepolymer from reactants which comprise:

- (i) at least one organic polyisocyanate
- (ii) [if poly(ethylene oxide) groups are present,] at least one isocyanate-reactive

- compound providing said poly(ethylene oxide) groups in the resulting polyurethane polymer, and
- (iii) at least one isocyanate-reactive compound providing said acid-functional groups in the resulting polyurethane polymer;
- II. chain extending said prepolymer component using an active hydrogen component comprising an active hydrogen chain extending compound(s) to form said polyurethane polymer; and
- IV. forming an aqueous solution of said polyurethane polymer;

wherein said polyurethane polymer is capable of forming films which are soluble in water at temperatures between 5° and 35° C.

33. (Amended) Process according to any one of claims 30 to 32 wherein the isocyanate-reactive compound providing acid functional groups in step I is a dihydroxyalkanoic acid of formula



where R<sup>1</sup> is hydrogen or alkyl[, preferably of 1 to 5 carbon atoms].

35. (Amended) Process according to claim 30 wherein the isocyanate-reactive compound providing acid functional groups in step [1] I is a diol bearing a sulphonic acid alkali metal salt[, preferably a sulphonic acid sodium salt].

36. (Amended) Process according to claim [35] 30 wherein the reactants for forming the prepolymer component in step I include an isocyanate-reactive compound(s) which is monofunctional with regard to isocyanate-reactive functionality and acts as a chain-terminating material for the prepolymer.

37. (Amended) Process according to claim [36] 30 wherein said active hydrogen component used in step II comprises an active hydrogen chain extending compound(s) provided by the reaction of water with said prepolymer[, preferably being the sole chain extending material used in step II].

38. (Amended) Process according to claim [37] 30 wherein said active hydrogen component used in step II comprises an added active hydrogen chain extending compound.

39. (Amended) Process according to claim 38, wherein said added active hydrogen chain extending compound is a compound selected from the group consisting of a primary or secondary aliphatic, alicyclic, [,] aromatic, araliphatic or heterocyclic polyamine, [preferably a diamine, or] hydrazine (including its monohydrate) [or] and a substituted hydrazine.

41. (Amended) Process according to claim 40 wherein at least 90 weight% of the acid functional groups in the polyurethane polymer are neutralised[, more preferably 100%].

42. (Amended) Process according to claim 41 wherein at least 50 weight %[, more preferably 100 weight %] of the base(s) used for neutralisation is selected from the group consisting of Group IA monovalent metal bases or basic salts, triethanolamine, 2-methyl-2-amino-1-propanol, and quaternary ammonium hydroxides.

43. (Amended) Process according to claim 42 wherein said base is selected from the group consisting of NaOH, KOH, and LiOH[, and is preferably NaOH].

46. (Amended) Polyurethane polymer which has:

2 to 35 weight %, based on the weight of polyurethane polymer, of poly(ethylene oxide) groups which have a chain length(s) corresponding to a number average molecular weight within the range of from 300 to 3000 Daltons;

15 to 150 milliequivalents, per 100g of polyurethane polymer, of acid-functional groups; and wherein

at least 50% of the acid-functional groups are neutralised, such neutralisation being with a base(s) at least part of which is a non-volatile base(s);

and said polyurethane polymer being a chain extended product formed using:

(A) a prepolymer component comprising an isocyanate-terminated polyurethane prepolymer, said component being formed from reactants which comprise :

- (i) at least one organic polyisocyanate;
- (ii) [if poly(ethylene oxide) groups are present,] at least one isocyanate-reactive compound providing said

- poly(ethylene oxide) groups in the resulting polyurethane polymer; and
- (iii) at least one isocyanate-reactive compound providing said acid-functional groups in the resulting polyurethane polymer, and
- (B) an active hydrogen component comprising an active hydrogen chain-extending compound(s);

and, wherein said polyurethane polymer is capable of forming a water-soluble film which is soluble in water at temperatures between 5° and 35° C.